

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A process for preparing a polyamine derivative, comprising:
- (a) reacting one or more polyamine with a first number of one or more molecules selected from the group consisting of lactones, hydroxyacids, cyclic carbonates, and mixtures thereof, to form a polyamine derived compound, wherein each of the polyamines comprises a second number of one or more  $-NH_2$  functional groups and a third number of one or more second amine functional groups, the second amine functional groups having a lower lactone reactivity than the  $-NH_2$  functional groups, and the polyamine-derived compound having one or more moiety selected from the group consisting of amide groups, urethane groups, and combinations thereof; and
  - (b) reacting the polyamine-derived compound with an amine modifier and one or more amine-specific reagents to form an intermediate, the one or more amine-specific reagents having a fourth number of two or more amine-specific functional groups selected from the group consisting of isocyanate groups, anhydride groups, acid chloride groups, maleate groups, fumarate groups, citraconic ester groups, itaconic ester groups, and (meth)acrylate groups, the amine modifier being given by formula III:



wherein:

- x is an integer of 1 or 2;
- y is an integer of 0, 1 or 2;
- z is an integer of 0 or 1;
- x+y is 1 or 2;
- x+y+z is 1 or 2;

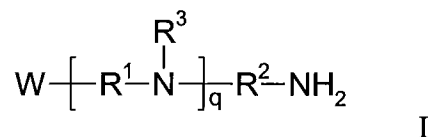
Y represents an anchoring moiety selected from the group consisting of aliphatic groups having from 2 to 10 carbon atoms containing one or more tertiary amino group and heterocyclic groups containing one or more basic ring nitrogen atom, the heterocyclic group being attached to the  $NH_{3-x-y-z}$  group by an alkylene group containing up to 10 carbon atoms;

Y'' represents a stabilising moiety with affinity for a matrix; and,

Y' represents a further group that is neither an anchoring moiety nor a stabilising moiety;

wherein the intermediate comprises at least one polyamine residue and at least one amine modifier residue linked by the amine-specific reagent.

2. (Previously Presented) The process according to claim 1, wherein the intermediate comprises two or more polyamine residues.
3. (Previously Presented) The process according to claim 1, wherein the first number of one or more molecules selected from the group consisting of lactone, hydroxy acid, and cyclic carbonate molecules is from 0.1 to 10 times the second number of  $\text{-NH}_2$  functional groups of the polyamine.
4. (Previously Presented) The process according to claim 1, wherein the fourth number of amine-specific functional groups is from 0.1 to 10 times a sum of the third number of second amine functional groups of the polyamine-derived compound and a fifth number of amine functional groups of the amine modifier.
5. (Previously Presented) The process according to claim 1, wherein the polyamine is given by formula I



where:

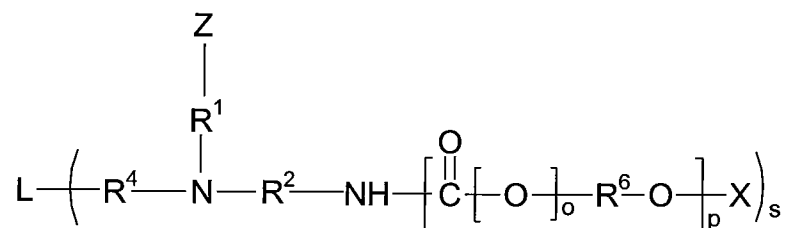
q is an integer from 1 to 10;

$\text{R}^1$  and  $\text{R}^2$  are each independently an alkylene group with from 1 to 10 carbon atoms;

each  $\text{R}^3$  is independently selected from the group consisting of hydrogen, hydroxyalkyls, alkylamines, polyalkylamines and polyalkylpolyamines; and

W is a hydroxy or an amine.

6. (Previously Presented) A process according to claim 1, wherein:  
 one or more of the polyamine-derived compound and the intermediate comprises one or more –OH groups; and  
 the process further comprises reacting one or more of the –OH groups of the polyamine-derived compound or the intermediate to attach a matrix-compatible moiety having a molecular weight of more than 250 to the polyamine-derived compound or the intermediate.
7. (Currently Amended) The process according to claim 6-1, wherein:  
 said reacting one or more of the –OH groups comprises reacting one or more of the –OH groups with one or more compound selected from the group consisting of epoxides, lactones, cyclic carbonates, and hydroxy acids to form a matrix-compatible moiety; and  
 the matrix-compatible moiety comprises a linear or branched, substituted or unsubstituted C<sub>4</sub>-C<sub>30</sub> alkyl, a polyester, a polyether, a polyetherester or a polyesterether group.
8. (Cancelled)
9. (Previously Presented) A polyamine derivative given by formula II:



II

wherein:

each R<sup>4</sup>NR<sup>1</sup>ZR<sup>2</sup>NH moiety is a residue of a polyamine;

each C(O)[O]R<sup>6</sup>O moiety is a residue of a member selected from the group consisting of lactone, hydroxyacid, cyclic carbonate, and combinations thereof;

L is a residue of an at least bifunctional amine-specific reagent having two or more amine-specific functional groups selected from the group consisting of isocyanate groups, anhydride groups, acid chloride groups, maleate groups, fumarate groups, citraconic ester groups, itaconic ester groups, and (meth)acrylate groups;

$R^1$  and  $R^2$  are each independently an alkylene group with from 1 to 10 carbon atoms;

each index o is independently 0 or 1;

index p represents the average number of moiety  $C(O)[O]R^6O$  per  $R^4NR^1ZR^2NH$  moiety and has a value ranging from 0.1 to 30;

each X is selected from the group consisting of hydrogen or, wholly or partly, a substituted or unsubstituted, linear or branched, hydrocarbon group, a polyester, a polyether, a polyetherester or a polyesterether group;

index s represents an integer of 1 to 10, wherein if s is 1, the amine-specific reagent L is further reacted with an amine modifier given by formula III



wherein:

x is an integer of 0, 1 or 2;

y is an integer of 0, 1 or 2;

z is an integer of 0 or 1;

$x+y$  is 1 or 2;

$x+y+z$  is 1 or 2;

Y is an anchoring moiety with affinity for a pigment surface or substrate;

$Y''$  is a stabilising moiety with affinity for a matrix; and

$Y'$  is a further group that is neither an anchoring moiety nor a stabilising moiety;

$R^3$  is independently selected from the group consisting of hydrogen, hydroxyalkyls, alkylamines, polyalkylamines and polyalkylpolyamine;

$R^4$  represents a group  $R^3$  minus a proton;

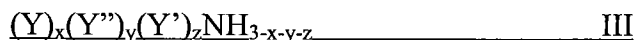
Z- represents a group  $W'-[R^1-NR^5]_{q-1}-$ , wherein W' is a hydroxy or an amine or the reaction product of the hydroxy or the amine with one or more lactone, hydroxyacid, and/or cyclic carbonate; and each  $R^5$  independently is a group  $R^3$  or the reaction product of  $R^3$  with amine-specific reagent L.

10. (Previously Presented) A polyamine derivative obtained by the process according to claim 1.

Claims 11-12. (Cancelled)

13. (Previously Presented) A printing ink formulation, comprising the polyamine derivative of claim 9.
14. (Previously Presented) A coating composition, comprising the polyamine derivative of claim 9.
15. (Previously Presented) A pigment dispersant, comprising the polyamine derivative of claim 9.
16. (Previously Presented) A printing ink formulation, comprising the polyamine derivative of claim 10.
17. (Previously Presented) A coating composition, comprising the polyamine derivative of claim 10.
18. (Previously Presented) A pigment dispersant, comprising the polyamine derivative of claim 10.
19. (Cancelled)

20. (Currently Amended) A process for preparing a polyamine derivative, comprising:
- (a) reacting one or more polyamine with a first number of one or more molecules selected from the group consisting of lactones, hydroxyacids, cyclic carbonates, and mixtures thereof, to form a polyamine derived compound having one or more member selected from the group consisting of an amide group, a urethane group, and a combination thereof, wherein each of the polyamines comprises a second number of one or more  $-NH_2$  functional groups and a third number of one or more second amine functional groups, the second amine functional groups having a lower lactone reactivity than the  $-NH_2$  functional groups; and
  - (b) reacting the polyamine-derived compound with one or more amine-specific reagent to form an intermediate, the amine-specific reagent having a fourth number of two or more amine-specific functional groups selected from the group consisting of isocyanate groups, anhydride groups, acid chloride groups, maleate groups, fumarate groups, citraconic ester groups, itaconic ester groups, and (meth)acrylate groups wherein the polyamine-derived compound is further reacted with an amine modifier being given by formula III:



wherein:

x is an integer of 0, 1 or 2,

y is an integer of 0, 1 or 2,

z is an integer of 0 or 1,

x+y is 1 or 2,

x+y+z is 1 or 2,

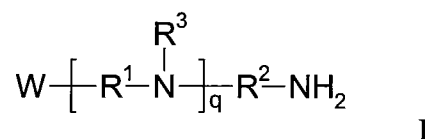
Y represents an anchoring moiety with affinity for a pigment surface or substrate,

Y'' represents a stabilising moiety with affinity for a matrix, and

Y' represents a further group that is neither an anchoring moiety nor a stabilising moiety;

wherein the intermediate comprises at least one polyamine residue and at least one amine modifier residue linked by the amine-specific reagent.

21. (Cancelled)
22. (Previously Presented) The process according to claim 20, wherein the intermediate comprises two or more polyamine residues.
23. (Previously Presented) The process according to claim 20, wherein the first number of one or more molecules selected from the group consisting of lactone, hydroxy acid, and cyclic carbonate molecules is from 0.1 to 10 times the second number of  $\text{-NH}_2$  functional groups of the polyamine.
24. (Currently Amended) The process according to claim 20, wherein the fourth number of amine-specific functional groups is from 0.1 to 10 times a sum of the third number of second amine functional groups of the polyamine-derived compound and a fifth number of amine functional groups of the an amine modifier.
25. (Previously Presented) The process according to claim 20, wherein the polyamine is given by formula I



where:

q is an integer from 1 to 10;

$\text{R}^1$  and  $\text{R}^2$  are each independently an alkylene group with from 1 to 10 carbon atoms;

each  $\text{R}^3$  is independently selected from the group consisting of hydrogen, hydroxyalkyls, alkylamines, polyalkylamines and polyalkylpolyamines; and

W is a hydroxy or an amine.

26. (Previously Presented) A process according to claim 20, wherein:  
one or more of the polyamine-derived compound and the intermediate comprises one or more  $\text{-OH}$  groups; and

the process further comprises reacting one or more of the –OH groups of the polyamine-derived compound or the intermediate to attach a matrix-compatible moiety having a molecular weight of more than 250 to the polyamine-derived compound or the intermediate.

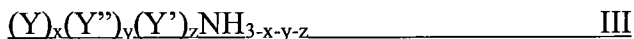
27. (Previously Presented) The process according to claim 26, wherein:

said reacting one or more of the –OH groups comprises reacting one or more of the –OH groups with one or more compound selected from the group consisting of epoxides, lactones, cyclic carbonates, and hydroxy acids to form a matrix-compatible moiety; and

the matrix-compatible moiety comprises a linear or branched, substituted or unsubstituted C<sub>4</sub>-C<sub>30</sub> alkyl, a polyester, a polyether, a polyetherester or a polyesterether group.

28. (Previously Presented) A process for preparing a polyamine derivative, comprising:

- (a) reacting one or more polyamine with one or more molecules selected from the group consisting of lactones, hydroxyacids, cyclic carbonates, and mixtures thereof, to form a polyamine derived compound having one or more member selected from the group consisting of an amide, a urethane group, and a combination thereof, wherein each of the polyamines comprises one or more –NH<sub>2</sub> functional group and one or more second amine functional group, the second amine functional group having a lower lactone reactivity than the –NH<sub>2</sub> functional group; and
- (b) reacting the polyamine-derived compound with one or more polyisocyanate to form an intermediate comprising two or more isocyanate functionalities wherein the polyamine-derived compound is further reacted with an amine modifier given by formula III:



wherein:

x is an integer of 0, 1 or 2,

y is an integer of 0, 1 or 2,



z is an integer of 0 or 1,

      x+y is 1 or 2,

      x+y+z is 1 or 2,

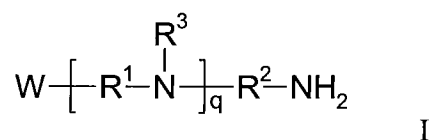
Y represents an anchoring moiety with affinity for a pigment surface or substrate,

Y'' represents a stabilising moiety with affinity for a matrix, and

Y' represents a further group that is neither an anchoring moiety nor a stabilising moiety;

wherein the intermediate comprises at least one polyamine residue and at least one amine modifier residue linked by an isocyanate functionality.

29. (Cancelled)
30. (Previously Presented) The process according to claim 28 wherein the intermediate comprises at least two polyamine residues.
31. (Previously Presented) The process according to claim 28, wherein a number of lactone, hydroxy acid, and/or cyclic carbonate molecules is from 0.1 to 10 times the number of –NH<sub>2</sub> functional groups of the polyamine.
32. (Currently Amended) The process according to claim 28, wherein the amine-specific reagent is present in an amount such that a number of amine-reactive groups is from 0.1 to 10 times a sum of a number of second amine functional groups of the polyamine-derived compound and a number of amine functional groups of the an amine modifier.
33. (Previously Presented) The process according to claim 28, wherein the polyamine is given by formula I



where:

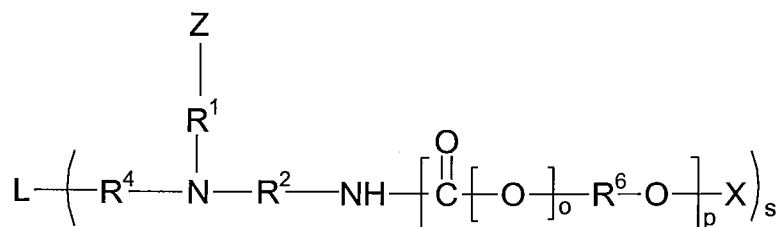
q is an integer from 1 to 10,

$R^1$  and  $R^2$  are each independently an alkylene group with from 1 to 10 carbon atoms,

each  $R^3$  is independently selected from the group consisting of hydrogen, hydroxyalkyls, alkylamines, polyalkylamines and polyalkylpolyamines, and

W is a hydroxy or an amine.

34. (Previously Presented) A process according to claim 28, wherein:  
one or more of the polyamine-derived compound, the intermediate, and a combination thereof, comprises at least one –OH group; and  
the process further comprises reacting the one or more –OH group of the polyamine-derived compound or the intermediate to attach a matrix-compatible moiety having a molecular weight of more than 250 to the polyamine-derived compound or the intermediate.
35. (Currently amended) The process according to claim ~~28~~34, wherein:  
reacting the one or more –OH group comprises reacting the one or more –OH group with one or more compound selected from the group consisting of epoxides, lactones, cyclic carbonates, and hydroxy acids to form a matrix-compatible moiety; and  
the matrix-compatible moiety comprises a linear or branched, substituted or unsubstituted  $C_4$ - $C_{30}$  alkyl, a polyester, a polyether, a polyetherester or a polyesterether group.
36. (Currently amended) A polyamine derivative given by formula II:



II

wherein:

- each  $R^4NR^1ZR^2NH$  moiety is a residue of a polyamine;
- each  $C(O)[O]R^6O$  moiety is a residue of a member selected from the group consisting of lactone, hydroxyacid, cyclic carbonate, and combinations thereof;
- L is a residue of an at least bifunctional amine-specific reagent wherein the amine-specific reagent is selected from the group consisting of isocyanate groups, anhydride groups, acid chloride groups, maleate groups, fumarate groups, citraconic ester groups, itaconic ester groups, and (meth)acrylate groups;
- $R^1$  and  $R^2$  are each independently an alkylene group with from 1 to 10 carbon atoms;
- each index o is independently 0 or 1;
- index p represents the average number of moiety  $C(O)[O]R^6O$  per  $R^4NR^1ZR^2NH$  moiety and has a value ranging from 0.1 to 30;
- each X is selected from the group consisting of hydrogen, and, wholly or partly, a substituted or unsubstituted, linear or branched, hydrocarbon group, a polyester, a polyether, a polyetherester or a polyesterether group;
- index s is 1, and the amine-specific reagent L is further reacted with an amine modifier given by formula III



wherein:

- x is an integer of 1 or 2,
- y is an integer of 0, 1, or 2,
- z is an integer of 0 or 1,
- x+y is 1 or 2,
- x+y+z is 1 or 2,
- Y represents an anchoring moiety selected from the group consisting of aliphatic groups having from 2 to 10 carbon atoms containing one or more tertiary amino group and heterocyclic groups containing one or more basic ring nitrogen atom, the heterocyclic group being

attached to the  $\text{NH}_{3-x-y-z}$  group by an alkylene group containing up to 10 carbon atoms.

$\text{Y}''$  is a stabilising moiety with affinity for a matrix, and

$\text{Y}'$  is a further group that is neither an anchoring moiety nor a stabilising moiety;

$\text{R}^3$  is independently selected from the group consisting of hydrogen, hydroxyalkyls, alkylamines, polyalkylamines and polyalkylpolyamine;

$\text{R}^4$  represents a group  $\text{R}^3$  minus a proton;

$\text{Z-}$  represents a group  $\text{W}'\text{-[R}^1\text{-NR}^5\text{]}_{q-1}\text{-}$ , wherein  $\text{W}'$  is a hydroxy or an amine or the reaction product of the hydroxy or the amine with one or more lactone, hydroxyacid, and/or cyclic carbonate; and

each  $\text{R}^5$  independently is a group  $\text{R}^3$  or the reaction product of  $\text{R}^3$  with amine-specific reagent L.